AI Planning
Exercise Sheet 5

Date: 27.11.2014
Students: Axel Perschmann, Tarek Saier

Exercise 5.1

Proof by induction over the structure of χ.
Base case $\chi = \top$: then $s' \models \top$.
Base case $\chi = \bot$: then $s \not\models \bot$.

Base case $\chi = a \in A$: assume $s \models a$ and $on(s) \subseteq on(s')$.
Wich $a \in on(s)$ we get $a \in on(s')$, hence $s' \models a$.

Inductive case $\chi = \chi_1 \wedge \chi_2$

$$\begin{aligned} s \models \chi &\iff s \models \chi_1 \wedge \chi_2 \\ &\iff s \models \chi_1 \text{ and } s \models \chi_2 \\ &\implies s' \models \chi_1 \text{ and } s' \models \chi_2 \\ &\iff s' \models \chi_1 \text{ and } \chi_2 \\ &\iff s' \models \chi \end{aligned}$$

Inductive case $\chi = \chi_1 \vee \chi_2$ (Analogous to previous case)

$$\begin{aligned} s \models \chi &\iff s \models \chi_1 \vee \chi_2 \\ &\iff s \models \chi_1 \text{ or } s \models \chi_2 \\ &\implies s' \models \chi_1 \text{ or } s' \models \chi_2 \\ &\iff s' \models \chi_1 \text{ or } \chi_2 \\ &\iff s' \models \chi \end{aligned}$$

Exercise 5.2

(a) $\Pi^+ = \langle A, I, O, \gamma \rangle$ with A, I, γ unchanged and

$$\begin{aligned} O &= \{eatCake^+, bakeCake^+\} \\ eatCake^+ &= \langle haveCake, \top \wedge haveNoCake \wedge eatenCake \rangle \\ bakeCake^+ &= \langle haveNoCake, haveCake \wedge \top \rangle \end{aligned}$$

(b) $\pi = bakeCake, eatCake$
π in Π results in $\{haveCake \mapsto 0, eatenCake \mapsto 1, haveNoCake \mapsto 1\}$
π^+ in Π^+ results in $\{haveCake \mapsto 1, eatenCake \mapsto 1, haveNoCake \mapsto 1\}$